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Upgrade Projects in High-resolution Spectroscopy

Steve Heald¹, Clement Burns², Thomas Gog¹, Randy Winans¹, Ercan Alp¹, Gerald Seidler³, John Hill⁴, Brent Fultz⁵, Ken Kemner¹, and Jeffrey Miller¹

¹Argonne National Laboratory, Argonne, IL 60439

²Western Michigan University, Kalamazoo MI 49008

³University of Washington, Seattle, WA 98195

⁴Brookhaven National Laboratory, Upton, NY 11973

⁵California Institute of Technology, Pasadena, CA 91106

The APS has a history of strong and successful programs in high-resolution spectroscopy, and these will be significantly improved in the APS upgrade. In most cases the upgrade will result in dedicated beamlines with optimized sources and enhanced detectors, expanding both capabilities and availability. At sector 20, dual canted undulators will be used to provide for a dedicated beamline for an enhanced LERIX (lower-energy resolution inelastic x-ray scattering) spectrometer, giving up to 50x improvement in signal. The existing microspectroscopy station at sector 20 will be optimized for high-resolution fluorescence spectroscopy and ultra-dilute detection capabilities. Similarly sector 30 will be upgraded for full time operation of an improved HERIX (high-energy resolution inelastic x-ray) spectrometer with an optimized undulator source. The MERIX (medium-energy resolution inelastic x-ray scattering) programs at sectors 9 and 30 will be consolidated to a full-time program at 9-ID, again with an optimized undulator and upgraded spectrometer. At sector 3 the undulator will be optimized, and a new hutch added to house a super- inelastic x-ray scattering spectrometer. Finally, the only bending magnet beamline in this section, 9-BM, will be optimized for catalyst research with improved optics and a quick-scanning monochromator. We will briefly describe these upgrades, expected performance improvements, and some of the science that will be enabled by the enhancements.